REMARKS

Referring to the Office Action, the Examiner indicated that the Information Disclosure Statement filed on August 8, 2008 failed to comply with the requirements of 37 CFR 1.98(a)(1) for failing to list a submitted non-patent literature document.

In reply, the Applicant previously submitted a Supplemental Information Disclosure Statement on February 9, 2010 including the indicated non-patent literature document. It is submitted that this prior submission of the Supplemental Information Disclosure Statement resolves the issue raised by the Examiner.

The following amendments have been made to the Specification, Drawings and Claims of the Application in order to address the objections of the Examiner, as set forth below:

(a) Drawings and Claims 12 and 27 - The Examiner has objected to the drawings under 37 CFR 1.83(a) for failing to show the feature of the "gravity separation vessel" recited in Claims 12 and 27.

In reply, the Applicant has amended Claims 12 and 27 to claim "…wherein the collection vessel is adapted for gravitationally separating the drained collected droplets and the drained gas stream into a plurality of products."

Support for this amendment is found in the Application as filed at: Page 8, line 32 - Page 9, line 6; Page 18, lines 15 - 16; Page 22, line 33 - Page 23, line 2; Page 26, lines 13 - 18; and Page 31, lines 25 - 29;

(b) Drawings and Reference Characters - The Examiner has further objected to the drawings under 37 CFR 1.84(p)(4). These objections are as a result of various typographical errors contained in the Specification and Drawings as originally filed.

In reply, the Applicant has corrected the following typographical errors:

(i) Reference characters “30” and “36” - Page 31, line 28, has been corrected to properly refer to the “collection vessel (36)”.

Thus, reference character “30” refers to the “flow conditioner”, while reference character “36” refers to the “collection vessel” of Figures 1A - 1B throughout the Specification;

(ii) Reference characters “130” and “136” - Page 35, line 4 has been corrected to properly refer to the “collection vessel (136).” Further, Page 32, line 32, has been corrected to properly refer to the “flow conditioner (130).”

Thus, reference character “130” refers to the “flow conditioner”, while reference character “136” refers to the “collection vessel” of Figures 2A - 2C throughout the Specification;

(iii) Reference characters “135” and “146” - Page 34, line 9 has been corrected to properly refer to the “drainage mechanism (146).”

Thus, reference character “135” refers to the “combined conditioner/distributor”, while reference character “146” refers to the “drainage mechanism” of Figures 2A - 2C throughout the Specification;

(iv) Reference character “124” - Page 32, line 15, has been corrected to properly refer to the “collector surface (124).” Further, Figure 2A has been corrected to utilize reference character “124” to refer to the “first collector surface”;

(v) Reference characters “122, 126” - Page 33, line 31 has been corrected to properly refer to the “flowpaths (122, 126)”; and

(vi) Reference character “152” - Reference character “152” has been deleted from Figures 2A and 2B as this reference character is not found in the Specification;

(c) Claims 13 and 28 - The Examiner has objected to Claims 13 and 28 under 37 CFR 1.75(c) for failing to further limit the subject matter of a previous Claim.

In reply, the Applicant has amended Claims 13 and 28 to claim the collector surface or each collector surface being comprised of "a material wettable by the droplets."

In this regard, Page 13, lines 21 - 32 of the Specification states:

> "The collector surface may be constructed entirely of a wettable material or the collector surface may be lined or coated with a wettable material. The wettable material is preferably comprised of a solid but may be comprised of a liquid. For example, the collector surface may be comprised of a solid surface which is lined or coated with a liquid material. The liquid material may be comprised of a liquid having the same composition as the droplets to be collected, or the liquid material may be comprised of a liquid having a different composition from the droplets to be collected.
>
> The selection of a suitable wettable material will depend upon the droplets which are intended to be collected by the collector surface. For example, in some applications, it may be desirable for the collector surface to be "water-wettable" while in other applications, it may be desirable for the collector surface to be "oil-wettable"."

Support for this amendment is found in the Application as filed at: Page 13, lines 15 - 32; Page 25, line 21 - Page 26, line 6; Page 28, lines 25 - 33;

(d) Claims 10 - 12 and 25 - 27 - The Examiner has rejected Claims 10, 11, 12, 25, 26 and 27 under 37 USC 112, 2nd paragraph as being indefinite.

First, each of these Claims has been objected to for containing insufficient antecedent basis for terminology used in the Claims, particularly "drained collected droplets" and "drained gas stream."

In reply, independent Claim 1 has been amended to provide the antecedent for the "drained collected droplets." Each of Claims 10 - 12 and 25 - 27 depend directly or indirectly from amended Claim 1.

Further, in reply, dependent Claims 11 and 26 have been amended to provide the antecedent for "drained gas stream." Claims 12 and 27 depend from Claims 11 and 26 respectively.

Second, the Examiner objects to Claims 11 and 26 for failing to provide an antecedent basis for the terminology "the gas stream." However, these Claims depend indirectly from amended independent Claim 1 which claims "an apparatus for removing liquid droplets from a gas stream…" and is comprised of a "flowpath for the gas stream." Thus, there is a proper antecedent basis for these Claims which recite a mechanism to drain "the gas stream from the flowpath."

Furthermore, the Examiner states that it is not clear how the "drainage mechanism" functions. In reply, amended Claims 11 and 26 further clarify that the drainage mechanism drains the collected droplets from the collector surface as drained collected droplets (Claim 1) and "<u>further</u> drains the gas stream from the flowpath as a drained gas stream." In other words, the drainage mechanism may provide <u>both drain functions</u>.

Page 14, line 31 - Page 15, line 2 and Page 16, line 32 - Page 17, line 4 of the Application state:

> "The gas drainage mechanism and the drainage mechanism for the collected droplets may be comprised of separate drainage mechanisms or may be comprised of <u>a single combined drainage mechanism for both the collected droplets and the gas stream</u>. Preferably the gas drainage mechanism and the drainage mechanism for the collected particles are comprised of a single combined drainage mechanism."
>
> "Preferably the drainage mechanism is comprised of one or more apertures defined by the collector surface. More preferably the drainage mechanism is comprised of one or more slits defined by the collector surface. In preferred embodiments the drainage mechanism is comprised of a plurality of slits which are spaced axially along the collector surface between the flowpath inlet and the flowpath outlet. <u>The slits preferably function both to drain the collected particles from the collector surface and to drain all or a portion of the gas stream from the flowpath</u>."

Support for these amendments are found in the Application as filed at: Page 14, line 18 - Page 15, line 2; Page 16, line 24 - Page 17, line 4; Page 26, line 8 - Page 28, line 17; Page 30, lines 12 - 30; Page 33, line 27 - Page 35, line 5.

Thus, it is respectfully submitted that the amendments to the Specification, Drawings and Claims, and the remarks provided herein, fully address and overcome each of the Examiner's objections/rejections as listed above.

Referring further to the Office Action, the Examiner has rejected previous **Claims 1 - 4, 6 - 13 and 16** under 35 USC 102(b) as being anticipated by one of the following prior art references: U.S. Patent 3,626,673 to Stockton et. al.; U.S. Patent 1,928,706 to Sillers; U.S. Patent 4,919,696 to Higashi et. al.; U.S. Patent, 3,240,001 to Kuhn et. al.; U.S. Patent 2,349,944 to Dixon; and U.S. Patent 3,413,778 to Lavery et. al.

Further, the Examiner has rejected previous **Claims 5, 14 - 15 and 17 - 31** under 35 USC 103(a) as being unpatentable over each of the previously cited prior art references and further in view of U.S. Patent 3,616,623 to Reid.

It is respectfully submitted that each of these rejections of the Examiner is overcome by the remarks that follow.

Applicant's Invention -

Amended independent Claim 1 is directed at an apparatus for removing liquid droplets from a gas stream, the apparatus comprising at least one flowpath assembly, wherein each flowpath assembly is comprised of:

(a) a flowpath for the gas stream, the flowpath comprising a flowpath inlet;

(b) a collector surface, positioned adjacent to the flowpath so that the gas stream is in communication with the collector surface as the gas stream passes through the flowpath, for collecting the droplets as collected droplets;

(c) **a flow conditioner** in communication with the flowpath inlet, **for conditioning the gas stream to provide substantially turbulent and generally axial flow of the gas stream through the flowpath**; and

(d) a drainage mechanism associated with the collector surface, for draining the collected droplets from the collector surface as drained collected droplets.

As stated in the Application at Page 6, lines 10 - 25:

> "Embodiments of the invention are based upon some or all of the following principles:
>
> (a) liquid droplets entrained in a gas stream will be attracted by interfacial tension or adhesion forces to a collector surface such as a collector wall;
>
> (b) the likelihood or probability of liquid droplets moving close enough to the collector surface for the adhesion forces to collect the droplets on the collector surface as collected droplets can be significantly enhanced by exposing the gas stream to the collector surface under substantially turbulent flow conditions, such that the droplets are directed to randomly contact (or nearly contact) the collector surface; and
>
> (c) coalescing of the collected droplets on the collector surface can produce a population of coalesced collected droplets which can subsequently be separated from a gas phase using gravitational or inertial separation technologies."

Further, Page 9, lines 8 - 21 of the Application further discusses the flow of the gas stream:

> "An important feature of the invention is that substantially turbulent flow in the gas stream in the vicinity of the collector surface is provided. In other words, **the flow of the gas stream through the flowpath should at least exhibit a Reynolds number which exceeds the minimum Reynolds number for transition from laminar flow to turbulent flow** so that the flow can be considered to be either transitional or fully turbulent. More preferably, the flow of the gas stream through the flowpath should exhibit a Reynolds number which is near to or exceeds the minimum Reynolds number for fully turbulent flow so that the flow can be considered to be fully turbulent.

> As a result, the term "**turbulent flow**" as used herein is intended to encompass flow which may be considered to be either transitional or fully turbulent, but which preferably is fully turbulent. The term "**substantially turbulent flow**" as used herein is intended to encompass turbulent flow in which minor or insubstantial portions of the gas stream may not experience turbulent flow at a particular time or location."

Thus, the "<u>flow conditioner</u>" is provided for conditioning the gas stream to provide <u>substantially turbulent and generally axial flow of the gas stream through the flow path</u>. Page 15, lines 25 - 34 of the Application states:

> "The flow conditioner may be comprised of any structure, device or apparatus which is capable of conditioning the gas stream to provide substantially turbulent and generally axial flow of the gas stream through the flowpath. Turbulent flow of the gas stream increases the probability that the droplets will contact the collector surface or be placed within suitable proximity to the collector surface so that the adhesion forces between the droplets and the collector surface will cause the droplets to become collected on the collector surface.
>
> The generally axial flow of the gas stream distinguishes the invention from inertial separation technologies which utilize cyclonic flow to cause droplets to collect on a surface due to the effects of centrifugal acceleration."

Further, Page 26, lines 20 - 25 of the Application states:

> "The method and apparatus must create flow conditions of the gas stream leading to a transitional or turbulent flow regime in the vicinity of the collector surface, since turbulence is the main mechanism used to project droplets entrained in the gas stream toward the collector surface. The method and apparatus should preferably also minimize re-atomization and re-entrainment of collected droplets back into the gas stream through breaking of pools, films or rivulets of collected droplets."

<u>Anticipation -</u>

In order to anticipate a claim, the reference must teach <u>each and every element</u> of the claim (U.S. Manual of Patent Examining Procedure "MPEP" §2131).

Thus, in order for each of <u>Stockton et. al.</u>, <u>Sillers</u>, <u>Higashi et. al.</u>, <u>Kuhn et. al.</u>, <u>Dixon</u> and <u>Lavery et. al.</u> to anticipate independent Claim 1, <u>Stockton et. al.</u>, <u>Sillers</u>, <u>Higashi et. al.</u>,

Kuhn et. al., Dixon and Lavery et. al. must **each** disclose the whole of the subject of the Claims. Thus, **each** reference must teach **each and every** element or feature of the Invention, as claimed.

It is respectfully submitted that each of Stockton et. al., Sillers, Higashi et. al., Kuhn et. al., Dixon and Lavery et. al. fails to disclose one or more of the claimed features, as detailed below. Therefore, it is respectfully submitted that at least independent Claim 1 is NOT anticipated thereby.

(a) U.S. Patent 3,626,673 to Stockton et. al.

Stockton et. al. provides "baffles for vessels through which fluids are passed for phase separation". Specifically, the "flow of multi-phasic fluids has its Reynolds number controlled to facilitate separation of the fluid phases." (Column 1, lines 12 - 16; Column 5, lines 35 - 39 of Stockton et. al.)

More particularly, production from the well flows into the vessel 1 and is comprised of gaseous and liquid hydrocarbons. The initial momentum of the fluids is absorbed by unit 7. The free liquids are directed toward the lower portion of the vessel 1, while the gaseous fluids, with entrained liquids, are flowed within unit 6. (Column 2, lines 53 - 59; Column 3, lines 5 - 45 of Stockton et. al.).

As stated at Column 3, lines 14 - 17 of Stockton et. al.:

> "Within unit 6 the fluids are divided into a series of parallel substantially unobstructed columnar paths t**o establish laminar flow**."

Furthermore, the purpose of the "laminar flow" is particularly described by Stockton et. al. at Column 3, lines 18 - 23:

> "Laminar flow **suppresses turbulence within the body of fluids** within unit 7. Deviation of the direction of fluid flow is kept to a minimum. The drops of liquid within the fluid body follow a predetermined trajectory and reach a surface of unit 6 to which they adhere and on which they collect. "

Accordingly, the express intention of Stockton et. al. is to provide for **laminar** flow through the separation unit. Thus, Stockton et. al. clearly does NOT describe, teach or suggest a "flow conditioner" as claimed by **amended independent Claim 1(c)** for conditioning the gas stream to provide **substantially turbulent … flow** of the gas stream through the flowpath.

Rather, it is submitted that Stockton et. al. teaches away from the Applicant's claimed apparatus as it expressly requires the suppression of turbulence and the minimization of any deviation of the direction of fluid flow.

As a result, it is submitted that Stockton et. al. does not anticipate independent Claim 1.

Further, Stockton et. al. is cited as anticipating **Claims 6 - 8 and 11**. In this regard, it is submitted that Stockton et. al. does not describe, teach or suggest at least these dependent Claims.

Claim 1 claims "a drainage mechanism … for draining the collected droplets from the collector surface." **Claim 6** further claims the drainage mechanism as being "comprised of at least one aperture **defined by** the collector surface." **Claims 7 and 8** further claim the drainage mechanism as being comprised of "a plurality of slits **defined by** the collector surface" and "wherein the slits are spaced axially along the collector surface between the flowpath inlet and the flowpath end."

However, as shown in Figures 4 and 5 and as described by Column 4, lines 11 - 28 of Stockton et. al., the liquid drains along the plates of each module 23, and then flows from module to module, until the liquid finally falls out of the bottom of the unit 6. Thus, the liquid simply flows off of the end of each plate. The plates do not define apertures or slits therein.

Finally, **Claims 8 and 11** claim "wherein the flowpath is comprised of a flowpath end." Page 14, lines 18 - 26 of the Application states:

> "The flowpath comprises a flowpath inlet. The flowpath may further comprise a flowpath outlet so that the gas stream passes through the flowpath from the

> flowpath inlet to the flowpath outlet and exits or drains from the flowpath via the flowpath outlet.
>
> Preferably, however, the flowpath is comprised of a flowpath inlet and a flowpath end so that the gas stream passes through the flowpath between the flowpath inlet and the flowpath end, but does not exit or drain from the flowpath via the flowpath end. Instead, the gas stream passes through the flowpath and exits the flowpath via a gas drainage mechanism positioned between the flowpath inlet and the flowpath end."
>
> (Refer also to the flowpath end 43 and 143 in the Figures of the Application).

Stockton et. al. does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. The flowpath has an inlet and an outlet from the unit 6. The production fluids pass into the unit 6 though the inlet. Once passing through the unit 6, the "gaseous fluid, freed of the liquid, flows out of the vessel." (Column 3, lines 23 - 28 of Stockton et. al.).

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Stockton et. al. shows two separate outlets or drainage mechanisms for the unit 6. The liquids drain from the baffles in the unit 6, as described above, into the bottom of the vessel 1, for removal through a liquid outlet. The gas stream passes through the unit 6 into the end of the vessel 1, where it is removed through a gas outlet 5. Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

(b) U.S. Patent 1,928,706 to Sillers

Sillers is directed at a mist extractor having a vertical cylindrical chamber 2 and horizontally offset inlet and outlet couplings 3 and 4 for connection with a gas pipeline. Further, a mist extractor unit 5 is mounted within the chamber 2 which consists of a plurality of vertical zig-zag plates 6. Finally, a vertically inclined screen 13 is provided for protecting the plates 6 from injury due to large particles carried by the gas. (Page 1, lines 20 - 32 and 40 - 43 of Sillers).

Thus, gas enters the inlet coupling 3 of the mist extractor 1 and passes through the heavy screen 13, which prevents large particles from entering and injuring the plates 6. <u>The gas is then "forced to take a downwardly extending path through the unit 5 because of the lower position of the outlet coupling 4."</u> Further, the gas is forced to take the "zig-zag path" through the plurality of zig-zag plates provided in the extractor. Pockets are provided in the plates 6 for trapping liquid, which flows vertically down the plates 6 to the bottom of the unit 5, while the gas flows out of the unit 5 though the outlet coupling 4. (Page 1, lines 53 - 69 and 80 - 86 of <u>Sillers</u>).

Accordingly, it is submitted that <u>Sillers</u> does NOT describe, teach or suggest a "<u>flow conditioner in communication with the flowpath inlet</u>" as claimed by **amended independent Claim 1(c)** <u>**for conditioning the gas stream** to provide substantially turbulent and generally axial flow of the gas stream through the flowpath</u>. Specifically, the gas stream simply flows into the chamber 2 through the inlet coupling 3. The screen 13 is provided to prevent large particles from entering and protect the plates 6 from injury. The screen 13 does NOT condition the flow, as claimed.

In addition, no further structure is provided for "conditioning the gas stream" to provide substantially turbulent flow of the gas stream through the flowpath. Rather, the gas stream simply enters the chamber 2 and flows downwardly due to the positioning of the outlet coupling 4. Any "turbulence" imparted to the gas stream appears to be provided by the zig-zag plates 6, i.e. the "collector surface", rather than a "flow conditioner."

Furthermore, as claimed by the Applicant in **amended independent Claim 1(c),** the <u>flow conditioner</u> conditions the gas stream to provide substantially turbulent and <u>generally axial flow of the gas stream through the flowpath</u>. It is submitted that <u>Sillers</u> does not describe or suggest "generally axial flow of the gas stream through the flow path." Rather, as stated, when the gas stream enters the chamber 2 of the mist extractor unit 5, the gas is "<u>forced to take a downwardly extending path through the unit 5 because of the lower position of the outlet coupling 4</u>."

As a result, it is submitted that <u>Sillers</u> does not anticipate independent Claim 1.

Further, Sillers is cited as anticipating **Claims 3 - 4, 6 - 9 and 11**. In this regard, it is submitted that Sillers does not describe, teach or suggest at least these dependent Claims.

Claims 3 - 4 claim the collector surface being comprised of "a generally planar surface." However, Sillers teaches away from a generally planar surface. As indicated, Sillers does not provide a "flow conditioner." Therefore, in order to provide turbulence within the chamber, the mist extractor unit 5 comprises **a plurality of zig-zag passageways** which "cause the gas to be thrown first against one side and then the other thereof, causing the mist to liquefy on the surfaces of the passageways. The pockets assist by setting up a turbulent motion in the gas." (Page 1, lines 80 - 86 of Sillers).

Claims 6 - 8 further claim the drainage mechanism as being comprised of at least one aperture, or a plurality of slits, **defined by** the collector surface." However, no such apertures or slits are defined by the zig-zag plates 6 or pockets provided by Sillers. The liquid simply drains along the plates 6 to the bottom of the chamber 2.

Claims 8 and 11 claim "wherein the flowpath is comprised of a flowpath end." Sillers does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. More particularly, the gas enters the unit 5 though the inlet coupling 3 and exits through the outlet coupling 4.

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Sillers shows two separate outlets or drainage mechanisms for the mist extractor 1. The liquids drain from the plates 6 into the bottom of the chamber 2, for removal through a liquid outlet 17. The gas stream passes through the plates 6 and out of the chamber 2 through the outlet 4. Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

(c) <u>**U.S. Patent 4,919,696 to Higashi et. al.**</u>

<u>Higashi et. al.</u> describes a "super cooling-type mist eliminator apparatus." In this regard, an exhaust gas mixing device 20 is disposed upstream of a "crimped-plate type" mist separator 23 and downstream of an exhaust gas cooling means 15. The exhaust gas cooling means 15 includes non-cooling sections 18 and supercooling elements 17 for passage of an exhaust gas therethrough. (Column 2, lines 18 - 31; Column 3, lines 39 - 54 of <u>Higashi et. al.</u>).

Referring to Figure 1, the exhaust gas mixing device 20 is disposed upstream of the crimped-plate type mist separator 23. The exhaust gas mixing device 20 is comprised of a mechanism for <u>diverting gas flow</u> emanating from the non-cooling sections 18 of the exhaust gas cooling means 15 <u>to intersect</u> with gas flow emanating from the super cooling elements 17. (Column 3, line 60 - Column 4, line 3 of <u>Higashi et. al.</u>).

The <u>intersection of the gas flows</u> produces turbulence in the gas flow <u>intended "to promote mixing" of the non-cooled and super-cooled gases</u>. The cooled and uncooled gases "are <u>quickly mixed</u> … and … a supersaturated state, is established." <u>The mixed gases then flow into the mist separator 23</u>, where enlarged dust particles are removed "by inertial collision" and condensate water is collected and led to a condensate water pipe 26. (Column 4, lines 1 - 40 of <u>Higashi et. al.</u>).

<u>No further description of the mist separator 23 is provided, nor is any description provided regarding the nature of the **flow of the mixed gases entering the mist separator 23**</u>.

As a result, it is respectfully submitted that <u>Higashi et. al.</u> does not describe, teach or suggest a "<u>flow conditioner in communication with the flowpath inlet</u>" as claimed by **amended independent Claim 1(c)** <u>**for conditioning the gas stream** to provide substantially turbulent and generally axial flow of the gas stream through the flowpath</u>. Rather, the mixing device 20 of <u>Higashi et. al.</u> is provided to simply "mix" the gases, as described above, prior to entering the mist separator 23. <u>Higashi et. al.</u> does not provide any specific discussion of the nature of the gas flow through the separator 23.

As a result, it is submitted that Higashi et. al. does not anticipate independent Claim 1.

Further, Higashi et. al. is cited as anticipating **Claims 3 - 4, 6 - 8 and 11**. In this regard, it is submitted that Higashi et. al. does not describe, teach or suggest at least these dependent Claims.

Claims 3 - 4 claim the collector surface being comprised of "a generally planar surface." However, Higashi et. al. teaches away from a generally planar surface. Rather, Higashi et. al. teaches a "crimped-plate type" mist separator 23. Referring particularly to Figure 1 and Figure 5, which shows a "known crimped-type mist separator, the plates are clearly not "generally planar."

Claims 6 - 8 further claim the drainage mechanism as being comprised of at least one aperture, or a plurality of slits, **defined by** the collector surface." However, Higashi et. al. provides no details or description whatsoever regarding the crimped plates.

Claims 8 and 11 claim "wherein the flowpath is comprised of a flowpath end." Higashi et. al. does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. More particularly, the gas stream enters one end of the mist separator 23 after passing through the mixing device 20 and exits out of the opposed end of the separator 23. No flowpath end is provided or described.

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Higashi et. al. shows two separate outlets or drainage mechanism for the mist separator 23. The liquids drain from the crimped plates of the separator 23 into the bottom of the vessel, for removal through condensate water pipe 26. The condensate water is collected from the pipe 26 in condensate water tank 27, as shown in Figure 2. The gas stream passes through the separator 23 and out of the end of the vessel, where it is conducted to a gas heater 6, as shown in

Figure 2. Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

(d) U.S. Patent, 3,240,001 to Kuhn et. al.

Kuhn et. al. provides a device for the separation of moisture drops from a gas stream. The device provides for an assembly of parallel spaced plates between which the gas stream flows. (Column 1, lines 12 - 15 of Kuhn et. al.).

Specifically the gas stream enters a first assembly of corrugated plates 3, followed by a second assembly of flat plates 9. The corrugated plates 3 provide for turbulence of the flow and repeated changes in flow direction which causes drops of liquid to be separated out of the gas stream. The gas flow then leaves the exit edges 8 of the corrugated plates 3, passes into an intermediate casing part 20 which has no plates and subsequently enters the flat plates 9 at their entrance edges 9a. "The consequent sudden diversion of flow in the direction of the plates 9 involves a certain pressure loss." Thus, moisture-drops are received in the flat plates. "The function of the flat plates 9 is to receive the drops of moisture which are drawn from the rear-edge 8 out of casing part 1 and to drain them away." (Column 1, lines 64 - 71; Column 2, lines 12 - 22 and lines 35 - 45 of Kuhn et. al.).

Thus, Kuhn et. al. does not discuss any "conditioning" of the gas flow at the inlet of the corrugated plates 3, or prior to the gas flow entering the corrugated plates 3. Furthermore, there is no discussion of the "conditioning" of the gas flow entering the flat plates 9. Rather, **the gas flow simply exits the corrugated plates 3 and enters into the intermediate casing part 20, which does not contain any plates or baffles**. The gas flow then flows within the flat plates 9. As a result, it is submitted that any gas flow into the flat plates 9 is not substantially turbulent in nature.

Accordingly, it is respectfully submitted that Kuhn et. al. does not describe, teach or suggest a "flow conditioner in communication with the flowpath inlet" in advance of either the corrugated plates 3 or the flat plates 9, as claimed by **amended independent Claim 1(c) for**

conditioning the gas stream to provide **substantially turbulent … flow** of the gas stream through the flowpath.

As a result, it is submitted that Kuhn et. al. does not anticipate independent Claim 1.

Further, Kuhn et. al. is cited as anticipating **Claims 6 - 8 and 11**. In this regard, it is submitted that Kuhn et. al. does not describe, teach or suggest at least these dependent Claims.

Claims 6 - 8 claim the drainage mechanism as being comprised of at least one aperture, or a plurality of slits, **defined by** the collector surface." However, no such apertures or slits are defined by either the corrugated plates or the flat plates provided by Kuhn et. al.

Rather, with respect to the corrugated plates 3, the drops of liquid run vertically down the surfaces of the plates and collect on a base plate 4. Openings 5 are provided in the base plate 4 so that the drops of liquid may pass into a collecting chamber 6. Thus, the "collector surfaces", being the corrugated plates 3, do NOT include any apertures or slits. Rather, the opening is in the base plate provided for the collector surfaces, not in the collector surface itself. (Column 2, lines 12 - 22 of Kuhn et. al.).

With respect to the flat plates 9, the moisture-drops also run vertically down the surfaces of the plates and collect on a base plate 10. Openings 14 are provided in the base plate 10 so that the drops may pass into a collecting chamber 15. Thus, the "collector surfaces", being the flat plates 9, also do NOT include any apertures or slits. Rather, the opening is in the base plate provided for the collector surfaces, not in the collector surface itself. (Column 2, lines 46 - 50; Column 2, line 69 - Column 3, line 1 of Kuhn et. al.).

Claims 8 and 11 claim "wherein the flowpath is comprised of a flowpath end." Kuhn et. al. does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. More particularly, as clearly shown in Figure 1, the gas stream enters the device at the designated "inlet" shown in Figure 1 provided at one end, and exits the device at the designated "outlet" shown in Figure 1 at the other end. No flowpath end is provided or described.

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Kuhn et. al. shows two separate outlets or drainage mechanism for the device. The liquids collect on the base plates 4, 10 and pass into collecting chambers 6, 16, for removal through liquid outlets 7, 16. Referring to Figures 1 and 2, the gas stream is shown as simply exiting the end of the device at the designated "outlet." Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

(e) U.S. Patent 2,349,944 to Dixon

Dixon provides a tank 10 having a mixed stream inlet pipe 12, a gas outlet pipe 14 and a plurality of liquid outlet pipes 16. The mixed stream first passes through a plurality of V-shaped, vertically oriented deflector baffles 20. The fluids of the mixed stream strike the baffles 20 and are caused to take a circuitous or tortuous path around and between said baffles." As a result, free liquids in the mixed stream are trapped by the baffles 20 and caused to flow downwardly. The baffles "act to remove substantially all of the free liquids flowing in the stream." The remaining gaseous stream then flows into a plurality of flat trays 24. (Page 2, Column 2, line 50 - Page 3, Column 1, line 56 of Dixon).

Thus, Dixon does not discuss any "conditioning" of the mixed stream at the gas inlet pipe 12, or prior to the mixed stream entering the deflector baffles 20. Furthermore, Dixon does not describe or provide for conditioning of the mixed stream to provide "generally axial flow of the gas stream" through the baffles 20. As indicated, the mixed stream strikes the baffles 20 and is caused to take a circuitous or tortuous path around and between said baffles.

In addition to the baffles 20, the interior of the tank 10 also includes a plurality of substantially flat trays 24 extending therethrough. As shown in Figure 3, the trays 24 are preferably inclined from the horizontal and extend transversely across the tank to provide longitudinal flow passages 25 therebetween. Specifically, "gaseous fluids enter and flow as

individual streams, through the flow passages 25 formed between the inclined trays or plates 24, the latter providing amplified collecting surfaces. As the streams flow through the longitudinal passages, the liquid particles in the stream gradually descend or fall downwardly and upon striking the trays, adhere thereto and accumulate thereon." Each tray 24 further has a longitudinal edge portion along the low side thereof recessed at 28 adjacent the tank wall, whereby liquid may flow from the tray downwardly on the tank wall and then to the liquid outlets 16. (Page 3, Column 1, line 57 - Page 3, Column 2, line 12; Page 3, Column 2, line 72 - Page 4, Column 1, line 25 of Dixon).

Dixon does not include any discussion regarding the nature of the flow through the passages formed by the trays 24. Furthermore, there is no discussion regarding "conditioning" of the gaseous fluids prior to entering the longitudinal flow passages 25 formed by the trays 24. The baffles 20 remove the free liquid and the remaining gaseous fluids are simply permitted to pass through the baffles 20 into an open space or area (not containing any baffles or deflectors), prior to entering between the trays 24. Clearly, there is no discussion of "turbulent flow" between the trays 24.

Accordingly, it is respectfully submitted that Dixon does not describe, teach or suggest a "flow conditioner in communication with the flowpath inlet" in advance of either the vertical baffles 20 or the flat trays 24, as claimed by **amended independent Claim 1(c) for conditioning the gas stream** to provide **substantially turbulent … flow** of the gas stream through the flowpath.

As a result, it is submitted that Dixon does not anticipate independent Claim 1.

Dixon is not cited against dependent Claims 6 - 9. However, Dixon is cited as anticipating **Claim 11**. In this regard, it is submitted that Dixon does not describe, teach or suggest at least this dependent Claim.

Claim 11 claims "wherein the flowpath is comprised of a flowpath end." Dixon does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. More particularly, as shown in Figure 1, the mixed stream enters the tank 10 at the mixed stream inlet pipe 12 provided at one end and is conducted into the vertical baffles 20 and subsequent flat plates

24. The gas exits the flat plates 24 at the opposite end of the tank 10 and is conducted through the gas outlet pipe 14. No flowpath end is provided or described.

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Dixon shows two separate outlets or drainage mechanisms for the flat plates 24. As indicated, the gas stream from the baffles 20 passes into one end of the flat plates 24 and is conducted therethrough to the opposed end of the flat plates 24, for removal through the gas outlet pipe 14. The liquids flow along the flat plates 24 to the recesses 28 at the edges of the plates and along the tank wall, for removal through the liquid pipe outlets 16. Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

(f) U.S. Patent 3,413,778 to Lavery et. al.

Lavery et. al. provides "vessels through which liquids and gases are passed for separation…the baffles within the vessels are arranged to provided passages in which the flow of fluids has its Reynolds number controlled without substantial effect upon the velocity of the fluids." A principle object of the invention is expressly stated to be the control of turbulence in the flow path of the gas–liquid separator. Specifically, Lavery et. al. states that "fundamentally, the internal structure of the separator must suppress excessively turbulent flow in the fluids passing through the separator." Thus, the vessel 1 includes unit 14 which is provided for scrubbing the fluid phase of its entrained liquids. Thus, the fluids "are flowed in a generally longitudinal course within unit 14. At the same time, the fluids are divided into a series of parallel substantially unobstructed columnar paths in which **laminar flow of the fluids is brought about" by suppressing turbulence within the fluids**. (Column 4, lines 15 - 33; Column 6, lines 44 - 59 of Lavery et. al.).

More particularly, the unit 14 is designed to "produce a Reynolds number indicative of laminar flow of the fluids, or close to laminar flow. Deviation in the direction of fluid flow is kept to a minimum." (Column 6, lines 60 - 73 of Lavery et. al.).

Accordingly, the express intention of Lavery et. al. is to provide for **laminar** flow through the unit 14. Thus, Lavery et. al. clearly does NOT describe, teach or suggest a "flow conditioner" as claimed by **amended independent Claim 1(c)** for conditioning the gas stream to provide **substantially turbulent … flow** of the gas stream through the flowpath. Rather, it is submitted that Lavery et. al. teaches away from the Applicant's claimed apparatus as it expressly requires the suppression of turbulence and the minimization of any deviation of the direction of fluid flow.

As a result, it is submitted that Lavery et. al. does not anticipate independent Claim 1.

Lavery et. al. is not cited against dependent Claims 6 - 9. However, Lavery et. al. is cited as anticipating **Claim 11**. In this regard, it is submitted that Lavery et. al. does not describe, teach or suggest at least this dependent Claim.

Claim 11 claims "wherein the flowpath is comprised of a flowpath end." Lavery et. al. does not provide a "flowpath end", as claimed, but rather provides a flowpath outlet. More particularly, as shown in Figure 1, the fluids flow enters the unit 14 at one end and exits the unit 14 at the opposite end. No flowpath end is provided or described.

Finally, **Claim 11** claims a drainage mechanism for draining the collected droplets from the collector surface as drained collected droplets **and** for further draining the gas stream from the flowpath as a drained gas stream, and is further comprised of a collection vessel for receiving the drained collected droplets **and** the drained gas stream.

However, Lavery et. al. shows two separate outlets or drainage mechanisms for the unit 14. The fluids flows through the unit 14 and the liquids contact the surfaces of plates 39, 40, 41. These collected liquids are picked up by scoops 45 and deposited onto the surface 46 of plate 40. Passageways 47 then conduct the liquids on the surface 46 down toward the lower portion of

the vessel 1, for removal through the liquid outlet 4 shown in Figure 1. As indicated, the gas stream from the unit 14 passes out of the end of the unit 14, for removal through gas outlet 5 shown in Figure 1. Thus, different structures are provided for draining each of the liquid and gas streams. Further, there is no discussion or suggestion that the streams be received in a single collection vessel.

Obviousness -

The Examiner has rejected previous **dependent Claims 5, 14 - 15 and 17 - 31** under 35 USC 103(a) as being unpatentable over each of the previously cited prior art references and further in view of U.S. Patent 3,616,623 to Reid.

As discussed in *KSR International Co. v. Teleflex Inc.,* 82 USPQ2d 1385 (2007), the determination of obviousness under 35 U.S.C. 103 is a legal conclusion based on factual evidence. The legal conclusion that a claim is obvious depends upon at least four underlying factual issues, as set forth in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966): (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) evaluation of any relevant secondary considerations.

Therefore, the test for obviousness must take into consideration the invention as a whole; that is, one must consider the particular problem solved by the combination of elements that define the invention. *Interconnect Planning Corp. v. Feil*, 227 USPQ 543 (Fed. Cir. 1985); *Manual of Patent Examining Procedure* §2143.02. The Examiner must, as one of the inquiries pertinent to any obviousness inquiry under 35 U.S.C. 103 recognize and consider not only the similarities but also the critical differences between the claimed invention and the prior art. *In re Bond,* 15 USPQ2d 1566 (Fed. Cir. 1990).

The fact that a reference teaches away from a claimed invention is highly probative that the reference would not have rendered the claimed invention obvious to one of ordinary skill in the art. *Stranco Inc. v. Atlantes Chemical Systems, Inc.*, 15 USPQ2d 1704 (Tex. 1990).

Moreover, the Examiner must avoid hindsight. The fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggest the desirability of the combination. *Manual of Patent Examining Procedure* §2143.01

The Federal Circuit stated in *In re Kotzab*, 55 USPQ2d 1313 (Fed. Cir. 2000) that:

> "…to establish obviousness based on a combination of elements…there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant…There must be a showing of a suggestion or motivation to modify the teachings of that reference…"

Each of the Claims rejected by the Examiner depend directly or indirectly from amended independent Claim 1. In this regard, as detailed above, <u>none of the references previously cited by the Examiner teach, describe or suggest all of the features of Claim 1</u>. In particular, none of the previously cited references describe, teach or suggest a "**flow conditioner** in communication with the flowpath inlet, for conditioning the gas stream to provide **substantially turbulent and generally axial flow of the gas stream through the flowpath**", as claimed in amended independent Claim 1(c).

<u>Reid</u> does not address this clear difference or deficiency in the previous references. In other words, <u>Reid</u> similarly does not describe, teach or suggest a "flow conditioner in communication with the flowpath inlet, for conditioning the gas stream to provide substantially turbulent and generally axial flow of the gas stream through the flowpath", as claimed in amended independent Claim 1(c).

Rather, <u>Reid</u> provides a gas scrubber 10 comprised of a mist eliminator 15 containing a plurality of vanes 16. However, <u>Reid</u> is cited against **dependent Claim 29 only** and thus, appears to be relied upon by the Examiner primarily for disclosing vanes 16 within the mist eliminator 15 which include a textured blotter surface 20.

<u>Reid</u> does not describe or disclose any "conditioning" of the gas stream at the gas inlet 12 to the gas scrubber 10 or at the inlet face 17a of the mist eliminator 15 containing the

vanes 16. Any turbulence occasioned to the gas stream occurs as a result of the flow through the vanes 16.

Further, as indicated, the Examiner has rejected dependent **Claims 17 - 31** as being unpatentable. With respect to these Claims, each of Claims 18 - 31 depend directly or indirectly from Claim 17. Further, the comments provided above for dependent Claims 3 - 4, 6 - 9 and 11 are also applicable to **dependent Claims 19, 21 - 24 and 26**.

With respect to **dependent Claim 17**, the apparatus further comprises <u>a plurality of parallel flowpath assemblies</u> and <u>a **distributor** associated with each of the flowpath inlets (for the plurality of flowpath assemblies), for distributing the gas stream to each of the flowpaths</u>.

The Examiner indicates that Claim 17 is unpatentable over <u>Higashi et. al.</u> in view of <u>Stockton et. al.</u> Specifically, the Examiner indicates that the claimed "distributor" is disclosed by <u>Higashi et. al.</u> However, it is respectfully submitted that neither <u>Higashi et. al.</u> nor <u>Stockton et. al.</u> discloses, teaches or suggests the Applicant's distributor as claimed in dependent Claim 17.

With respect to the "distributor", the Examiner refers to Column 3, lines 60 - 65 of <u>Higashi et. al.</u>. However, these portions of <u>Higashi et. al.</u> describe the exhaust gas mixing device 20 upstream of the mist separator 23. The mixing device 20 includes a gas mixer 21, which includes a "mechanism for diverting the gas flow emanating from the non-cooling sections 18 in the exhaust gas cooling device 15 so as to intersect the gas flow emanating from the supercooling elements 17."

These portions of <u>Higashi et. al.</u> were previously cited as disclosing the Applicant's "flow conditioner." Not only does the mixing device 20 not disclose the "flow conditioner", but it also does not disclose the "distributor." Rather, once the gases are mixed by the mixing device 20 by intersecting the two gas flows, <u>the mixed gas flow simply passes into the mist extractor 23. There is no description regarding "distributing the gas stream to **each** of the flowpaths."</u>

In fact, the Examiner states that <u>Higashi et. al.</u> **fails** to teach a plurality of parallel flowpath assemblies. Each flowpath assembly is comprised of a flowpath comprising a flowpath inlet (Claim 1). Thus, given that <u>Higashi et. al.</u> only teaches a single flowpath assembly, it is not

possible for Higashi et. al. to teach a distributor associated with **EACH of the flowpath inlets** for the plurality of flowpath assemblies, for distributing the gas stream to **EACH of the flowpaths**.

As a result, it is respectfully submitted that the Examiner should recognize and consider the critical differences between the claimed invention and the cited references. In this regard, it is submitted that even if the references were to be combined as indicated by the Examiner, the references would still fail to disclose all of the features or subject matter of the rejected dependent Claims, such as Claim 17 as discussed above. Accordingly, it is submitted that at least dependent Claim 17 is not rendered obvious by the cited references.

Summary

In summary, it is respectfully submitted that none of Stockton et. al., Sillers, Higashi et. al., Kuhn et. al., Dixon, Lavery et. al. and Reid, either alone or in combination, teach, disclose or suggest the Applicant's apparatus as claimed in amended independent Claim 1. It is therefore respectfully submitted that amended independent Claim 1 is allowable and allowance is respectfully requested.

Further, dependent Claims 2 - 31 depend directly or indirectly from independent Claim 1. Thus, it is respectfully submitted that these dependent Claims are allowable for the distinctions defined therein as well as for the reasons supporting the allowability of Claim 1. Accordingly, allowance of these dependent Claims is also respectfully requested.

In view of the foregoing amendments and remarks, it is submitted that this Application is in condition for allowance and allowance is respectfully requested.

Respectfully submitted,
RODMAN & RODMAN

/Charles Rodman/
Charles Rodman
Reg. No. 26,798
Applicant's Attorney

Dated May 19, 2010.

Rodman & Rodman
10 Stewart Place
Suite 2CE
White Plains, New York 10603

Phone: (914) 949-7210
Fax: (914) 993-0668